

RECORD

F.O.T. Roberts + 194

First time film
1964-11

Book 72
Begin # 45120
End # 45214

R.E. Roberts + J.P.W.

First film
1964-1.

Book 72

Begin # 45121
o 1 .. 45214

Collection and Field Note Book

No. 72

(Feb. 22, 1964 - May 3, 1964)

(45121 -- 45214)

<u>Italy</u>	<u>Pages</u>
Italian coast north of Rome.....	1
East Pakistan.....	4-42
Specimens collected 45121-45137	38-41
Air trip Calcutta to Bangkok	42-48
E. Pakistan.....	43
Burma.....	44-47
Thailand.....	47-48
Bangkok	49-50
Boat trip thru Bangkok.....	52-53
Air reconnaissance - Bangkok.....	54-69
Hong Kong.....	70
Taiwan.....	70
Hawaiian Islands.....	
Specimens collected 45138-45157	72-75
Chain of Craters Rd.....	76-77
Specimens collected 45158-45166	78-79
Chain of Craters	
Specimens collected 45167-45173	88-89
Hawaiian National Park	
Alo'i Hot Area.....	96-97

	<u>Pages</u>
Specimens collected 45174-45182	100-101
Chain of Craters	
California.....	102-103
Hayward	
Air trip San Francisco to Washington..	104-108
Virginia.....	
Great Falls.....	110
Prince William County.....	111-114
Specimens collected 45183-45189	112-113
Prince Wm. Co.	
Maryland	
C & O Canal between Paw Paw and Little Orleans.....	115-116
Virginia	
Albermarle County.....	117-121
Specimens collected 45190-45198	120-121
Albermarle Co.	
Florida.....	122-140
Specimens collected 45199-45214	136-139
Everglades National Park	

100 Kilo + type

Ind for Ind
162-1.

Book 72

Begin # 45120

End # 45214

USAF Operational
Navigator Chart

Andaman Is

ONE-K-9

1/1000000

Aeronautical Chart

1/250 000

AGC-ND 48-11

USAF Operational
Navigation Chart

Andaman Is.

ONC-R-9

1/1000000

Aeronautical Chart

1/250,000

AGC-ND 08-11

Joint Army/Navy

Book 72

P.M. Patch + spd

Trust him film
1962-11

Book 72
Begin # 4512
End # 45214



Standard[®] Miniature Blank Book

- No. 665 9½ x 6 120 Pages Units
- No. 667 9½ x 6 200 Pages Units
- No. 668 9½ x 6 300 Pages Units

Made in the Following Rulings

Journals, Day or Cash Books, Double \$ and Cts.
S. E. Ledgers, \$ and Cts.

Double Entry Ledgers

Records with Margin Line

When ordering give Number and Ruling desired

Made in U. S. A.

A Boottum & Pease Product

Pacific Vegetation Project
c/o National Research Council
2101 Constitution Ave., N.W.
Washington 25, D.C., U.S.A.

P.W. Patch + spcl

Print from film
1964-11

Book 72
Begin # 45120
End # 45214



Standard® Miniature Blank Book

- No. 665 9½ x 6 120 Pages Units
- No. 667 9½ x 6 200 Pages Units
- No. 668 9½ x 6 300 Pages Units

Made in the Following Rulings

Journals, Day or Cash Books, Double \$ and Cts.
S. E. Ledgers, \$ and Cts.

Double Entry Ledgers

Records with Margin Line

When ordering give Number and Ruling desired

Made in U. S. A.

A Baerum & Pease Product

Pacific Vegetation Project
c/o National Research Council
2101 Constitution Ave., N.W.
Washington 25, D. C., U.S.A.

1964

Italy

1

Feb. 22 - Italian coast north
of Rome.

A couple of coastal lagoons,
rather rectangular in outline.
A definitely volcanic mountain
a bit in from the coast.

Higher peaks of Apennines
to south strikingly snow-
covered.

A large circular lake
in front the coast. General
landscape drab.

Two more lakes inland.
Some of the Apennine peaks
are extremely rugged.

One of the lakes is also
almost circular. Are they
caldera lakes?

From lower altitude, the
coastal areas are greenish.
A few dark patches of spret or
brush, mostly very thin grass.
Some thorny brushy hills,
as we approach Rome.

Somewhat north of Rome an
area where the farmhouses are
small white, uniform and
uniformly distributed.

Just north of airport they
are large and bright red.
Rows of trees along many
roads and between farms.

The several Italian rivers seen
have great plumes of silt out from their mouths.

Ganges just below
junction with Brahmaputra
delta or flood-plain pattern
but very dry.

Feb. 23 - Dacca.

severe thunderstorm in
late afternoon.

— from p. 3

Lawsonia inermis
Livistona chinensis (Lod.)
Rondeletia odorata
Murraya paniculata
Clerodendrum infortunatum (Lam.)
Congea tomentosa
Cynodon dactylon
Tectona grandis

Bathysa odoratus
Chios
Verbena
Calistephos chinensis
Codiaeum variegatum
Euphorbia pulcherrima
Zinnia elegans
Frevillea robusta
Pitcairnia chinensis
~~*Fallimella malabarica*~~
Tamarindus indica
Mangifera indica
Albizia lebbeck
Iresia circumialis
Bougainvillea glabra
Ficus benghalensis
Jatropha
Jacaranda mimosifolia
Carica papaya
Artocarpus heterophyllus
Persea americana
Zinnia elegans
Lobularia maritima
Passiflora quadrangularis
Cassia spectabilis
Dianthus barbatus
Samanea saman
Calendula
Ficus religiosa
F. Benghalensis
Delonix regia
Eporrocea fistulosa
Helianthus annuus

Feb. 24 - road between
Darsa and Narayangang

Here the landscape is
one of polders, mostly fallow
at this time. In many of
them clay is being dug for
brick making. There are
many brick kilns and
fields where piles of brick
are stored. Brick seems to
be used for everything here
even pounded up for concrete
aggregate and road
material.

Left Narayangang
at just before 6 p.m.
and went down river.
After the thickly settled
part area was passed,
we passed, first rather
narrow sloping terraces,
which are muddy and
slightly grassy. These
rapidly expand from a
few m. wide to several
hundred m. and become
very flat, and thinly
green. ~~sparse~~ Back of
this is woody vegetation
low forest in appearance
but probably trees around
dwellings. Then, a short
distance down, a small in-

channel comes in from each
side. Then the tidal terrace
becomes narrow again and
the river becomes 1 km or
more wide. This seems to
be more in the nature of a
lake, but rather elongated.

Several sharp thunderstorms
before and after dark.

Feb 25 - Lower Coasta River, s.
Some flooded areas with
what appear to be fan palms
widely spaced, with patches
between them. Most of these,
emergent over some Phoenix
and perhaps other palms. Some
or slightly larger patches
are grassy areas.

Several miles down river
about a large marshy
area protected by a high
levee. High water is at
mostly back of the levee
abundant coconut, but
with other trees, and shrubs.
In places that are a low
platform ~~at~~ a few feet
surface a few inches above
normal high tide. Common
Phoenix paludosa is very
common. A few *Coccoloba*,
a few *Braesia*, some other trees,
plantings of *Bananas*, and
a few temporary dwellings
locally "thatched" of what
appear to be a small bamboo
considerably away and
bare except for very low
grass.

Plots of the wooded
patches of brushwood boats.

A small break in the river
shows that there are fallow
rice fields behind it.

The wooded and scrubbed
areas are dominated by
palms.

Coco *meridionalis*
Chamaerops humilis
Acrocomia aculeata
Braesia fibellifera
Bananas are abundant
here throughout and often
form thickets.

Abutting the landscape
changes. At high tides
at first about high tide
levee are covered by a
forest - a mix of second to close
swamp forest now high
of *Pithecellobium* ^{dry} *Acacia* ^{wet}
Phragmites

Grasses not very large 1-2 m.
Where there has been
stumping nowhere the mud
feet are not as big as
as generally there are
plots of *Manisotis* and
of *Chrysanthemum* mostly along
the margin.

Some grass in good condition
but not very tall. To the right
which is away from margin
lower this is an extensive and flat

Then west across to the east bank. There there are open forest - in ground that is rather high up - high trees, scattered brush rather than trees.

Back of this extensive flat that may be fraction by down and dry with many cattle grazing in them slightly higher areas have *Pithecellobium*, *Brosimum*, and various other trees, some dwellings.

Generally a band - an interlocking series - especially near from extensive rice fields, now broken crop - large areas of village with palm, bamboo, other trees. Possibly this appears to be the remains of an old artificial levee once broken then not.

Below this there appears to be a narrow strip of open slightly higher ground between the rice fields and the river, doubtless a reduced natural levee. This has low tangles of *Pandanus*, scattered *Pithecellobium* and other shrubs, also occasional dwellings with

more vegetation around them.

Then an artificial levee obviously made with a narrow strip of slightly elevated land flat as flat, mostly bare grassy flat with occasional scattered patches of *Pithecellobium* and *Brosimum*, a few dwellings.

This does not extend for some miles north, the river is flat off it - perhaps with it, and almost no vegetation, until well up in the "bed" of the Hainanque River.)

A turn or meander in the right and we start up the ~~bed~~ Hainanque River.

I immediately the banks are lined to some extent by *Nephthytis*.

There is a tendency here for *Annona* to be scattered as emergent in a dense bed of *Hemitelia minor* with some admixture of other species. This continuous layer may

be of varying height,
but on a flat surface
it tends to become
in places like savanna
scrub. The larger
mangroves are following out
the Heritiera forest in the
upper large streams.

This was an isolated
showing by a series of
local subsidence of which
due to weight of vegetation
and lack of force of
strength in days when
said to be a matter of
competition.

Occasional dead mangrove
trees occur in a belt
such as just to the side
but lack of an, however
forest appearance as seen
it.

Much of the uniform
young Heritiera appears
to form a rather narrow
belt along the river bank
in places a strip of Nipha
in front of this usually not
or only scattered.

Along eroding banks
an occasional fallen palm
tree, but this seems not to
be along banks so well
mane such, even many
small trees.

A few of older trees
are covered with epiphytes
Scattered around isolated
trees may be -
Pithecellobium of Nigeria, *Bauhinia*,
Heritiera.

Entered a small clearing
where the flora became
more mixed ^{and} ~~less~~ like

Hippocratea, ^{and} ~~and~~

Cerbera

Rhizophora, ^{and} ~~and~~

Tecomania

Tabebuia ^{and} ~~and~~ *rhodacanthus*

Calamus, ^{and} ~~and~~

Nypha ^{and} ~~and~~ *fruticans*

Adenanthera ^{and} ~~and~~ *caerulea*

Eccremocarpus ^{and} ~~and~~ *sapphirinus*

Phoenix ^{and} ~~and~~ *paludosa*

Acantus ^{and} ~~and~~ *eschscholtzii*

Along middle of the channel
there is a strip of much
lower forest, quite dense,
backed by taller forest plants.
Occasional areas sweep
into the stream, with leaves
over. In some place the
natural forest covers the sides
and usually is being cut down.
In places, esp where forest is
mostly Heritiera, erosion
exposes a dense mat of platform
of roots held up by vertical
enforcements in a sort of pyramid.

Marked up to 100 m. a
fringe of *Hymenaea* are very
commonly the only trees
to be seen outside of the
swamps, only appearing
at the edges.

Locally, in the forest
there is a definite layer of
Hymenaea podocarpa, usually
where the trees are older
and more and rather sparse.

Prevalently on roadsides up
chambers as dense as tall
bamboo thickets, fairly frequent
with *Pithecellobium* and
always a very low canopy over
the general bulk of the
ground here is often taller
than normal. In the hills
rarely a little higher.

Machaerium is still the best.

One spot seen with
a temporary dwelling, *Acacia*,
forests both tied up, and
around it a thin place
in the forest where all long
trees are cut out and the small
ones left.

Suddenly when most
feet are passing over them,
empty trees, orchids, etc., etc.
general, though not abundant
is almost a tree or bush tree
or rather shrub, which one

is common on edges of forest.

Firewood boats are very
common here. There are
no chowdharies, no jhumas;
purposeful, planned,
cultivation, watched, etc.

Many species are harvested.

Certainly no interpretation
of the vegetation of this area
can be very sound without
taking into account that
entire may be man's creation.

Straight artificial stands such as

just below Chella the
forest on the road to the bar
has cleared and re-planted.
The sweet orange, almost
up to Mungla, is still
unplanted.

Mungla is an important
part, with a number of trees
large & leaves & flowers.

Also a great many smaller with
(photos - look.)

Passing from Mungla to
Chella

Coco + *Pithecellobium*, bamboo,
several other trees, ~~woods~~ now
dwelling dominate landscape
between extensive rice
fields. Very slight natural
rivers along the fields being
eroded away with the brush
up. Hibiscus tiliaceus.

Those rice fields, and
very extensive rice fields
are by levees at the canal
and small clumps of
dwelling, scattered at first
several miles from the river,
on both sides. Then there
Phoenix around them, as
well as other trees. Then
Phoenix is gone, followed
and north, for a mile or so, by
the palm fronds of the oil palm
forest. West bank is much
more densely crowded, with
a ~~broad~~ broad ~~levee~~ or embankment
no man-made levee, for a
general assortment of trees -
some areas the dwelling
are, in general scattered, and
to others of the, the most great
difference between the south
bank, with a wide area
and more man-made ^{by} on the
the east bank, with sparse
~~brush~~ ^{bamboo} along the river, the
dwelling are mostly within
inland.

Then as one on the west
bank where tree are becoming
~~more~~ ^{more} ~~over~~ ^{over} the ground
still ^{still} ^{still} ^{still} ^{still} ^{still} ^{still}
extremely exposed, a cliff
rocks. Then and a stretch
with the low ~~few~~ ^{few} houses almost

far. The two banks
almost joined.

At Chalna turned west
into a narrow winding
channel through extensive
rice fields, with small
clumps of dwellings,
single dwellings, and
villages ~~south~~ surrounded
by trees - Avos, Cocos,
(brown photos)

Phoenix, Phoenix, Musa
Hibiscus tiliaceus, palamills
and a number of broadleaf
trees Samanea? Terminalia
catappa, ~~mostly~~ mostly not
identified. A few Brassas.
Rice fields protected by
low mud levees.

Most houses are thatch
roofed mud huts. Occasional
brick building.

West south bank
is almost a continuous
village. North bank
has bushes, locally trees.
Houses here are away from
channel bank.

Then both banks
more or less bare, for a
distance, then for a good
distance almost a continuous

village on south bank.
New levee on north.
Then bunderbans forest
again on south bank.
Mainly Heritiera. On
more recent sediments,
a thicket of a bright
green small tree with
scattered larger avicennia.
The small tree may be
~~Bruguiera~~ Bruguiera
cylindrica? The forest
varies from closed to
somewhat open.

On other bank a solid
band of Nipa. Rice fields
behind it.

In the forest there is
considerable of a sedge
and some Acanthus on the
ground, at least near edge.

Many photos showing
undercutting, root platform
Acanthus larger, etc.

In places the forest
becomes open and trees may
be a dense layer of
young Bruguiera. That
appears to be Excoecaria
has leaves turning yellow
or reddish, becoming
bare.

Recently deposited areas on
inner side of curves have

thickets of young Avicennia
some Bruguiera. Sloping
mud banks with sedges.
Very little Nipa.

Excoecaria seems to
be very abundant near
banks, where forest
is lower and more
open than back a few
tens or hundreds of m.

This may be due to opening
by wood cutters. The
stature and openness
both suggest much
cutting of larger trees.

Then large stretches
of almost pure Heritiera.
Locally with some epiphytes

Entered broad ~~Damgar~~
river. Now there is forest
on both sides. Up to here
on the left has been forest,
on right rice fields.

Dense Heritiera forest
with little variation
except where there is
a band of Nipa along
the shore. Where the
shore is low and sloping
there is Nipa, where there
is undercutting, no Nipa.

Feb. 24 - Sibsa River - To

On a low shore a dense luxuriant forest of Sonneratia.

Most of the shore of the broad part of the river is rather high, at least at or above high tide, and is being eroded away, exposing the root system so that trees appear to be stilt roots. Excoecaria and Bruguiera cylindrica (?) and probably some Sonneratia, as well as a light green tree with white trunks seem to make up this rather low forest.

On right bank the forest is very young and mixed, rather open, with locally a thick stand of acrostichum aureum. Bruguiera & Sonneratia and probably young Heritiera are abundant. I have seen Excoecaria (?) common. The ground is probably a little below high tide level.

On left bank an extensive stand of Nipa, the most seen yet, at one place.

Then on rt. bank a tall ragged, rather open forest of Sonneratia.

Entered a narrower channel. On left a rather young

stand of mostly Heritiera with occasional much larger Avicennia.

Same on right. Then on left an area of low scrub, components not identified, mostly not over 2 m. tall, tangled. Back of it tall scattered Avicennia.

In other side young Heritiera forest, occasional larger Avicennia trees.

Then on left a large cleared area of rice field, between crops (brown). This is many hundreds of acres, protected by a small levee. Rather small Heritiera forest on right bank.

Cattle grazing on rice stubble.

On rt. bank the Heritiera forest is very young, only a few m tall. Back of it a few hundred m. are taller trees.

This strip of young forest becomes narrower and much smaller. The ground at about high tide level is below. Much Acrostichum and a number of shrubs.

A few areas are devoid of any undergrowth, with rather few trees and numerous

stumps - said by Chowdhury
to be areas subsided and
trees cut off by "wave action".
Nearby areas, equally low
have undergrowth and dense
forest.

Most of forest along this
channel is young *Hemitelia*
several hundred m. wide,
backed by somewhat taller
Hemitelia.

A low stretch seems
to be entirely occupied by
a belt of dense, rather
tall *Avicennia*. Where
there is fresh deposition
here it is colonized entirely
by a thick growth of young
Avicennia 1-2 m. tall. (photos)

The left bank for this
entire distance is cleared
and in rice fields.

Some areas on rt. bank
show a scattering of large
old *Avicennia* in a thicket
of young trees, mostly *Hemitelia*.
Also some slumping of
edges down into channel
with trees still standing
but dead.

Then forest again on left
bank. Rather small
Hemitelia, fairly dense,
with, at least along river,

considerable undergrowth,
Acrosticum, shrubs, young
trees, *Phoenix* (local). Considerable
Cassuarina in most of
these forests.

Long stretches of medium
size dense forest of
Hemitelia with some
admixture of *Cassuarina*
and other trees, with
considerable undergrowth
of *Acrosticum*, *Acanthus*,
and some unidentified
shrubs, occasional *Musa*,
locally no undergrowth.
Stout conical pneumatophore
are certainly too abundant
to be accounted for by the
occasional *Bengaluru* - must
belong to *Hemitelia*.

Epiphytes locally common
appear to be a lanceolate
leaved *Polyphodium* and a
Hoya or *Dichidium*.

Many photos of this (l.s.w.)
and 1964-12 begin 1964-13.

Entered a much larger
river, undoubtedly Bibla
lined on both sides by rather
old dense *Hemitelia* forest.

Seems that what we
have been taking for *Hemitelia*
is really a mixture of that
and *Sonneratia*, with the

latter much more abundant along the shores. The prevalence of thick conical pneumatophores which should indicate *bonneratia* suggests this.

Along this river, especially in sections where it narrows, there is much evidence of deposition - strips of fibra and grassy soil banks (photo.)

In wide parts the banks are low - the forest rather open, large clumps of *Acrostichum* and a large grass, sedge.

A small creek completely lined with *Phoenix paludosa*.

Turned off to right in a smaller channel, with rice cultivation on left. Low bank with much slumping on right, small *Hemitelia* forest. Epiphytes common.

After a short distance we doubled back along a channel on the other side of the rice lands (photos Blvd. & Blvd.). On the right bank a very mixed forest, much *Excoecaria*, *Bruquea*, etc. On a large depositional

area a solid stand of young *Avicennia* 2-3 m tall. Locally predominantly *Hemitelia bonneratia*, more predominantly very mixed locally with a prominent shrub layer of possibly *Ceris* or *Kandelia*, locally & mixed undergrowth of shrubs and *Acrostichum*, patches of a grass-like plant - possibly a sedge or *Tharganium*.

Where *Cerrops* is dominant in understory the larger trees seem to be dying back from tips, some already dead.

On corner banks a thick fringe of young *Avicennia*.

In most of the forest here *Bruquea* is quite abundant at least very near the river probably not so back in forest.

Very locally a low-tucked forming undamned with narrow leafs.

Local patches of *Bruquea* extending well away from river banks.

Then rice on both banks back to Chalna.

Hibiscus
Coccothrinax
Tamarindus

From Malna upstream
the landscape is an entirely
artificial one, of wide
rice fields, enclosed by
very low levees, scattered
brushes in them, especially
along levees. Local village
and occasional isolated
dwellings appearing as
patches of woods. Coconuts,
Phoenix, *Borassus*, *Arecac*,
Musa, *Ficus* of numerous
Terminalia, ~~*Eugenia*~~,
and several other road-side
trees are planted around
the dwellings. (Photos b. & d.)

Part of the scattered shrubs
in the paddy fields is *Pandanus*.

The rice land here is
nearly above high tide
level.

In Shatna there are
abundant esp. *Coco*, *Onca*,
Ficus, *Alpinia*, *Mangifera*,
Salacca, *Musa*, and some
foot loof trees, as well as bamboo,
some *Borassus*, *Ledicia*, *Artocarpus*, *Steudneria*,
Tamarindus.

Water supply will now
be obtained from bamboo canoes
floating in large rafts in
good foothills kept from 10 to 2000 ft.

Jawa

Plant in Shatna
Pteridium aquilinum
Alternanthera sessilis
Heliotropium sp.
Cosmos bipinnatus
Ficus of 10-20 m. height
Antidesma madagascariense
Fobularia marilandica
Cornus sibirica
Elodice argentea
Rose sp.
Zizaniopsis miliacea
Tagetes
Citrus grandis
Muntingia calabura
Alcea rosea
Bougainvillea spectabilis
Cladodendron procumbens
Urtica dioica
Pithecellobium dulce
Or the non-tropical
Citrus aurantium
Opuntia sp. number of
Muraya paniculata
Lippia sp.
Passiflora quadrangularis
Acalypha hispida
Ischaemum var. *neglectum*
Chrysanthemum coronarium
Diplomia sp.
Chloris
Cuphea gracilis
Punica granatum
Mandevilla sanderi (synaptis)

Caudopavae pectoralis
 ferns & vines
 laborious mortars
 griddle of stone
 & sandstone dug up
 (M)
 various granaries
 (B) note 6000' elevation
 houses & villages

Feb. 27 - Legna River below
 Chandpur - vast plains
 not protected by levees -
 with thin grass, many
 cattle, a few scattered
 houses with no trees around
 them. In distance a left,
 going upstream, the normal
 landscape with palms,
 etc. around dwellings.
 On right for a distance
 nothing but low green
 fields then dwellings
 surrounded by banana
 plants ^{almost} no trees as far as
 one can see.

Several fish-wiers -
 bamboo fences with
 nets, extending across
 river from both banks
 leaving an opening in
 center for ships, the
 ends of the fence curled
 back and hooked toward
 downstream direction

Above this dwellings again
 approach the banks
 and are surrounded by
 tree and bamboo, and
 bananas much as seen
 yesterday, except that the
 trees seem to be younger.

No levees here, at all, but
 a flat terrace. (photos hot)

A few small patches of green rice, mostly yellow & little stubble here and there. hard to be planted to plots of various crops - pulses, mustard, sesams etc. Rice planted is grown during flood season - floating rice.

This special landscape may be adapted to the flooding. The more established houses are on low mounds up to 10 ft.

This is at the confluence of the Ganges and Megna.

Now on right is a vast plain ~~is~~ grass-covered with shelving beaches rather than the vertical banks seen below, and with no houses nor human works of any obvious kind whatever. The grass is tall and has some fruiting panicles - appears to be *Imperata* or *baccharum* or something similar. It is being gathered and carried in large bundles to small boats tied along the shore. Grass is *baccharum*, but habit not bunchy as in *S. spontaneum*. Inflo. is typically *baccharum*. Seen to be various other grasses and grasslike plants with

a few
coconuts
and trees

it, but not a single woody plant visible. Not a tree to be seen. This is in the angle formed by the banks with the combined rivers. Where there is an eroded bank here, the soil profile shows a dark surface layer a few inches thick, sharply separated from a white clay extending down to water level or below.

Above the river coming in from the right the land is a little higher, still not enclosed by levees very thickly scattered with houses and with an abundance of trees, esp. Areca, and quite a few *Brahmsa* & *Phoenix*, considerable bamboo. The houses are typically on mounds of earth. (Photos - 6)

The number of boats on this river is enormous. (Photos - 6) Many tiny fishing shiffs. Larger boats with sails and van apparently carrying cargo. Lines of floats indicating submerged nets are frequent.

Large groves of Areca. This must be an area of supply for Dacca and other cities.

Chandpur has far less trees than other towns seen and most of them rather low. surrounded by a ~~to~~ bank or levee of cobbles & boulders, doubtless imported.

Island or peninsula opposite is even more treeless and desolate. Very low. A few bananas and tallest vegetation some sort of vine, trained on trellises, is very prominent.

This island and its dwellings, and perhaps even parts of the town itself, are completely submerged in flood season.

It seems probable that anywhere here that there are no trees is subject to annual flooding of major importance. The fact that houses and trees are on mounds in this land that lacks levees supports this idea.

On up toward Dacca on the east bank of the enormously broad Rengna there is a broad flat plain with no trees and almost no grass. Some goats and cattle grazing in. Houses with abundant trees

in the distance, and as we go up the river, closer and closer to shore, until immediately at shore all on mounds.

Opposite an island, largely bare except for grass, but with small areas of houses and trees.

Here the trees surrounding the dwellings are not dominantly palms, as down stream, but dominantly mangos and several other broadleaf trees. A few areca and Phoenix.

On new sediments deposited last year sweet potatoes are grown.

Dwelling areas look like mango forests. Very few palm. No cocos.

Area of beautiful halomella on low bank to east. West bank much higher eroding and with a curious terraced appearance.

Above this on east bank wide open very low area with miscellaneous cultivation in strips.

A clump of houses and 2 brick mosques are being undermined by erosion and partly falling into the river. Much floating Sichoria.

Large areas here are very low, scarcely above river level. On east bank there are grass covered, or next considerable stretches of bare sand large areas of newly deposited silt, one or 2 years old, already planted to paddy, watered by tide.

ab. 28 - From Dacee to Madafu
~~Tong~~ Ocean low north over cultivated to rice, with some monkeys. Rice & millet and trifl.

Mango trees, salvinia, grass, Phoenix bamboo.

Rice fields up to Dacee.

In low areas along river, with winter rice, some other crops.

On better drained soil lotus and road-side marked by palm fruit.

Siglier more desolate and greatly uncultivated, small patches of road planted salt (10 mi from Margopen) coppiced banana specie in river. This apparently not allowed to reach more than about 2 m. tall.

On a buried impervious clay winding lower channels are in rice. A little of it is winter rice, rest green, in low spots. High spots wet.

Then lower, recent layer of fine sediment. All in winter rice, bright green will be harvested in April or May when more desolate higher land - bamboo thickets, rice in low spots.

Then flat land with wheat,

sugar cane with the
Mangroves
flat landscape cult. with
bamboo trees on mounds
beginning in dry season, peta.
wheat or corn

Ponds now and now common
much bamboo, mangroves among
hollings. Many palm trees,
color from red to orange. A few
Musa, Canav., Areca, Phoenix,
Koratia
large landscapes - flat
fields over on hollings, & where
there great numbers of palm trees
rice.

Tangail
Most of gardens near town.
Mangroves found on low slopes
dry. Some Cligia bushes
Scattered across river bottom
ponds with Eichornia
Patch of Eichornia
A few alluvial flat areas
divided into patches. Misc. cult.
A few trees - mangoes and the Bangalow
Kalihati - Few evergreen trees
now cut off with Eichornia
small groves, & some scattered bushes
on 10 ft. land

Road through all of this
country is on a high embankment.
Ditches & ponds along sides have
provided the material.

Rocky areas about scattered
about fields - to be burnt
for fertilizer

In distance we sight the low
scarp of reddish laterite
mound above Rangoon. Brachynema
specimens -

Area more common
Tropical scrub if well scrubbed
much closer
Aug 23
Forest agricultural and irriga-
tion system

Up or down reddish soil
calcareous soil crevices, but
to 20-30 cm. thick, but the open
mixed with other trees
has doubtless been selectively
cut.

Small savanna patches
Madafu jungle forest,
- on Madafu

It more poor, canopy very
incomplete. Trees & shrubs
undergrowth very sparse,
and Randia in patches

Vines abundant, nearly bar-
ren. Bauhinia, Latica, Morinda, etc.

Cover follows on most tree
or complete in shade upper ground
large bromeliads covering ground
a species of ferns to which
gathered off the old trees and

is covered, on a black sand,
the ground is bare.

The soil is very poor
down there, mostly
a thin layer of soil
of yellowish sand
and a lot of gravel
down to bedrock.

Nearly half of the
soil is washed off
soil by heavy rains
leaving a thin layer
on the edge of forest.

The soil has a thin layer
of humus about
half an inch thick.
The soil is very light
brown.

Habenaria concinna

Most of the forest has
been recently cut down so
almost nothing, being allowed
to sprout - 1/2' apart. Not
very strong, about 1 m. +?

Weeds near fence

Amaranthus spinosus
Argemone mexicana
Eichornia crassipes
Cyperus rotundus
Ipomoea batatas
Solanum nigrum

M. 09 (continued on page 38)
M. 10 in Marape

M. 37 Exposure of later
red and greyish to
bright red & blue mottling
within a few dm. than
to blue layer

M. 38 Top of hill
containing two intersecting
layers well into the earth
shows a small pin below the
vertical intersecting line
to conduct off the sap. Repeated
cutting, alternate on one, then
the other side give the earth
a curious zig-zag appearance.
Top used as a signal or marker

Feb. 23 - Kalipati Ferry
20 mi. n. of Dacca, Tangail Dist.
on banks of silt

45121 *Ranunculus scleratus*
rare

22 *Croton spatifolius*
common roadside weed

23 *Pteranta Clinopyne dictynna*
cultivated locally

23a *Alternanthera*

Feb. 23 - 7 mi. w. of Mymapur, Tangail Dist.

on steep road embankment

24 occasional *Emilia sonchifolia* W.

occasional on bare soil

Cuscuta reflexa
parasitic on *Zizyphus*

erect; petals yellow.

much-branched herb.

much branched from base,
to 2.5 m. tall; sterile; stems

said to be used for ~~wickerwork~~
matting.

prostrate

flowers purple, not
much exceeding involucre.

stems greenish yellow;
flowers white, on thickened
inflorescences coiled around
stems of host.

Feb. 23 - Madapur jungle track,
7. w. of Madapur, Tangail Dist.

in rather open disturbed
forest on hard clay soil.

26 (acanth.) *Lepidagathis incurva*
occasional *var. acuminate*

erect; flowers yellowish.

erect; bracts yellow.

small tree; flowers greenish.

extensive liana, with tendrils.

scandent shrub; stems .

27 *Balanus*

occasional

28 (~~bamboo~~) *Ventilago madraspatana* var. *calycularis*?
occasional in understory.

rare

29 *Entada purpurea*

common

30 *Ricinus communis* L. *Randi* cf. *lunatum*
rare

40 1964 East Pakistan

- 48131 *Syzygium flexuosum*
common
- 31 32 *Pithecellobium pentaphyllum*
common
- 32 33 *Bridelia retusa*
common
- 31 34 *Randia*?
occasional
- 35 *Shorea robusta*
dominant tree in forest
- 31 36 *Randia*
common -
- 32 37 same - in grassy savanna
very common

41

- wine climbing in bushes,
tree to 15 m. tall, sterile.
- small understorey tree,
- up to fruit bladd.
- shrub 2 m. tall
- tree 15 m. tall, sterile.
- heavily exploited for poles.
- shrub, 1.7 m. tall, sterile.
- sterile shrub up to 1.5 m. tall
main branches with large leaves,
small spiny branches with
small leaves.

Mar. 5 - Dacca

Common street trees are
Ziziphus jambos
Tamarindus indica
Ficus religiosa
Glicidium securianum
Mangifera indica
Annona sp.
Litchi chinensis
Diospyros ebenum

Marie Calandria - *Amphibians*

on Boring 7th st side. dep. 11:30
around Penns. except rather
an scattered large, small plots,
partly with hedge rows.

Villages wooded. Many parks
some long & narrow without
houses or lodges now. Much
elevation in distance to north.
scattered villages of the more
water eastward, opposite - and

Then the delta proper (greater
area & colored). I enjoyed especially
the wonder of the "steamed" rice
area, tawny brown at this season
and the flooded areas (photo).
All streams were inundated.
Flooded dwelling areas in rice
fields follow small channels,
photo-1. Just a few off this
situation, in along channel where
scattered dwellings between a

large, many others to
be found are rather poor
than clear so, and the entire
developing pattern is less
dense, and as great many
of what seem to be desiccated
or denuded pools, rather
against the base of the
ice fields. Then the
mouths of the great
rivers, a complex pattern
of islands, the over-lapped
glaciers with boulders,
some striking cases of slope
erosion in sea. Most of the
islands are cleared and in order,
but a few still have areas
of vegetation, apparently
Indian tobacco especially,
refined & wild.

This lagoon is a long narrow sandy island extending from north to south, and, with half water between it and

Another continuation of
normal sparsely wooded
coco palm forest, and
one small ridge to striking
off to south. Very little land
on either of these ~~islands~~ found
except on the small islet
to the westward. No trees
visible or any along coast
except above. I found the
two ferns below mentioned
as probably too large.
Another island or projection
part of mainland.

Separated from mainland
by a large isthmus. Delta
pattern on most of the shallow
part (Pabst - Brown).

The area and the
way south is a multitude
of very intricate ~~mosaic~~
mosaics of brown, greenish
with small tidal channels
and brownish to greenish
(nest) also with channels

off shore a ~~smooth~~ ~~area~~
fairly large area, with
green areas. Then a
south of Pinamisa and
small wood and marsh
projected islands.

Then a coast built up of
successive back ridges, with
channels and mangrove

1116
11171118
1119

1120

1121

1122

1132

behind very thin trees
small old trees and the
entire area irregular
soot with an intricate
mosaic of grassland and
soot with tidal channels
(whet). Es and a granite from
west. Little indication of
settlement or human activities.

The which were dense
forests, very little grass
except immediately back
of coast and along some of
these streams farther in
the hills with wood but
mostly dense to sloping
agriculture and various
stage of regrowth. This
extending more and more
tally as come get further
from coast. Still mostly
secondary, some large ones,
few open, wide extensions.

More inland ~~wood~~ hills even
larger but esp. smooth slopes

that a large, almost
completely denuded drainage
basin, with dry grassland
with some yellow forest in
the lands. Along some
some slightly grey, wet
mostly stoneless brown
plains, with complex old
flood plain pattern. (Pabst)

- There is nearly perfect alignment 115°
a couple of small rounded
hills in between.
watercourse crossing a few
spend, etc., generally muddy.
I noted other in some areas,
by big river with sand & silt
muddy? Much greater
cultivation in big flood
area. I find, and see
distributional patterns very
more brown plow with
wet & greenish soil
with dots of wide ponds or
troughs of dead vegetation (visibility
not good).
A large very muddy canal
crossing brown plow and
crisis, emptied into a large
distribution that follows on
in middle distance. Then
featuring a distribution in
its distance.
The one paralleling course
parallel pattern and extends a
very muddy soil. All the
countries here as brown
rice plow with apparently
almost no dwellers or
some manayos along
shores of river the rest of the
distribution.
Sea of mud, muddy but
blue channel in distance.

- crossed road at 45° left of course
Wooded with a ~~scrub~~
medium sized street between
which is rounded a bit up stream
some coastal low lands,
then wooded mountains
with apparently very
little shifting agriculture.
Complex country. Locally
various patterns.
Middle distance a small
complex of erosion and
scouring of streams. Alternating
gravel and too much clay to
wash out debris.
Shifting agriculture.
What appears to be a very
straight west facing escarpment
creek, one of about 25' with
erosion.
Brown ground, shifting
agriculture, meandering
stream with light colored
sand bars.
Visibility poor due to
curved meandering stream
if present by not less than
four. Roads here
descending to sea.
Ridged plan pattern cut
parallelly by canals
features decreasing problem
some of the rectangular plots
as though mechanically farmed.

48 1964 Thailand

- 1223 Fols food was abundant,
and rice as
1224 Well-irrigated, cult. rice &
cassava with ~~other~~ ^{other} ~~lumber~~
and tree along embank-
ment river mouth swamps,
rice terraces.
Internally cultivated land
abundant small villages cult.
rice, cassava, cult. water gels
planted ⁱⁿ ~~on~~ ⁱⁿ ~~near~~ ~~near~~
by the ~~agriculture~~ ~~agriculture~~
charcoal ~~Indonesia~~ ~~Indonesia~~
open land 1225
Rice fields largely cleared -
burned over, stubble -
yes, for rice
1226 Abundant mangrove forest
(Red Tones)

49

- May 7 Bangkok
street trees
hamamelis zeylanica
Terminalia catappa
Cocos nucifera
Jasminum sambac
Delonix regia
Ficus microcarpa
Mangifera indica

Plant, seen,
 becoming stay
Cordyline fruticosa
Nerium glaucum
Chloris nigriviridis
Plumeria obtusifolia
Erythrina variegata
Alstroemeria lutea
Hibiscus schizopetalus
Mangifera indica
Musa sapientum
Glossy species
Heliconia sp.
 ferns, in sea
Cestrum elegans
Maurandya salina
Codium variegatum
Godeffroya
Pandanus tectorius
Cornus sulphurea
Averrhoa bilimbi
Phoebe spathulata
Mora coerulea

May 9 - Very small
island thousands of trees, body
of long water very wooded,
Heliotrope numerous
Wormwood abundant.
Loranthodes
Cotoneaster
A large tree-leaf plantings
Eichornia
Pandanus
Canary red
Heliotrope numerous
Mimosa
Cotoneaster
Eichornia aquatica
Cyperaceae
~~Cyperaceae~~
Imperata topiaria
Canary yellow
Litophorus of Ficus nana
Juncus elongatus
Potentilla chinensis
Leskeas sp.
Promecia ornata
Circaea ciliata
Fox orange

Casa

Mixed with the house
and hundreds of bamboo.
Bamboo, Gladiolus, Pandanus,
numerous bunches of Coco,
bamboo, Ficus microcarpa,
ramondia, Caladium
or. Phragmites, Heliotrope, many others
in front, along the water's edge
masses of grass, heliconia,
A. uruguensis, Pandanus,
night in the water.

Many potted plants -
Orchid, Epiphora, Epiphyllum,
etc. in house.

The entire Konga lined on
both sides with bamboo
and apparently complete.
All nestled in the thickets.

One patch of jungle
a small and hidden.
Cotoneaster

Lynne's Impala
topiary
boisier

Mar. 10 - air reconnaissance n., e., s.
of Bangkok. Left side of
Dome 28. Take off 8:22 am. n.
rice fields brown to black,
stubble burned. Canals lined
with dwellings with trees back
now between in this area.
Canals very muddy.

Low spots with some water
or desiccating scattered
over field. Scattered area
of truck gardens, mostly
rice. No seed bed, no growing
field at this season. Mostly
burned stubble. Scores of
water buffalos. Not all
canals ~~but~~ are lined
with dwellings. Some

Dorassu, some casuarinas
(branches trimmed off high up,
growing back), mostly bamboo.
Some concentration in villages,
esp. well east. Some canals
lined with trees with few
houses. Vast areas of rice
with no dwelling bet. major
canals. Many fields plowed.

Change from bare field to
field with scattered termite
mounds with trees.

Limestone hills with tangled
thickets both on slope and
base. Patches of reeds? in
flower. Much small

8:34

8:41

8:43

bamboo on slopes. Very
scarce, degraded forest,
open, tall trees with
clear trunks, umbrella tops,
large patches of bamboo.
Some small great valley
bottoms with brown
rice fields. Some small
banana patches on slope,
but rather few.

Large areas mainly bamboo
thicket with scattered
trees, large areas open
tall forest with closed
understory. Bamboo
patches are light to
yellowish green, scattered
trees are leafless, but
mainly either green or
just leafing out.

Then good hill differences
based on strong relief
Photos scattered through
all of these types.

This forest now relatively
good but canopy only
about 40%.

Many patches of
grassland or meadow in
rolling areas in this
forest.

Full canopy forest
fairly large areas

Then more disturbed
but trees logged out
some cleannings, trees
with 50 - 75% canopy
then much better. Very
mixed composition.
Liana abundant in
canopy.

Patches of bamboo, dry,
apparently flowering.
Then more or less level,
rolling area, secondary
forest, very tangled
with lianas and bamboo.
Scattered Lagerstroemia
in flower (blue). Forest
becoming much drier
and almost a quite
deciduous on hill tops.
Then hills as road forces
more level areas between
are green, tangled. Much
slash + burn agriculture,
probably vulnerable for
the tangled small forest
cycle must be very long.
Canopy here is continuous
but much of it lianas.
Large plateau valley area,
mostly continuous forest.
Locally deciduous, locally
green, mostly semi-deciduous.

Then where terrain is
rough again, forest mostly
~~deciduous~~ evergreen,
locally much logged
out, tangled.

Then flatter country
with deciduous rather
open forest, locally
cleared. Here hills
have green forest, flat
rocky areas with
open deciduous forest
with a more closed
under story result of
logging. Then large
flat area, locally
rice field; locally
area of open wood,
locally area of savanna
obviously much burning,
dry & deciduous bamboo
patches, some very
considerable.

This is Kerat Plateau.
More and more savanna
and shrub savanna.
Rice local, in strips and
patches.

Appr. nation Ratchaburi.
Very eroded areas
between rice. Really
abused country.

New road b+o.

Back from Korat
Crossed over country.
little left but scrub
and occasional cult. patches.
scattered large trees.
Scattered small rice
patches and areas of
rice in lower spots. Then
a rather considerable area
of rice and termite mounds.
Scattered areas of bamboo.
Mostly rice.

Coconut plantations. Some
areas of scrubby semi-
forest, semi-savanna, very
heavily burned. Few trees
of any size. Rice only
local. Scattered larger
trees in rice areas. Few
in areas of slightly higher
semi-wooded, semi-cleaned
area. Large areas of very
open forest to savanna. Some
patches of sugar cane.

As country becomes rolling
forest and savanna mosaic,
then mostly forest as
relief gets greater. But
much shifting agriculture.
Villages. Forest is of very
open canopy, larger bunches
of trees left in clearing.
Very tangled second story

Then better and better
forest. Then open valley
~~soil~~ with deciduous
woods, ~~but~~ on slope
mostly bamboo,
apparently flowering
over considerable areas,
both on slopes and on
fairly level ground.
Patches of forest, patches
of clearing. Backbone
spontaneous takes over
clearings. Many tree
left in some clearing
plus others. Patches of
slender palms.

Then rougher country,
mosaic of patches of
forest and of bamboo.
Patches of what appear to
be ~~Bambusa~~ ~~for~~!
Corypha in forest.

Then more flat valley
land with deciduous
forest, some clearing,
semi-rice. Semi-deciduous,
rather than deciduous.
Much Corypha, esp on
lower slopes. Patchy
deciduous and evergreen.

Then rougher country,
more evergreen forest
but rather degraded,
wiry. ~~Massay~~ ~~dearly~~

Many clearings, since we are following road. Some wet spots. More slender fan palms. Patches of *baccharis*. Some rice areas. Forest very beaten up. Open to semi-open forest of large trees, result of clearing without removal of large trees.

Mosaic of shifting agriculture, flatter land more completely cleared, some rice, more *baccharis* spontaneous. Patches of thicket.

Now out of mountains.

Areas of scrubby, regenerating *Dipterocarpus*. Areas of rice. Mostly regenerating dipterocarp forest. Some bamboo. Then more and more rice, with bamboo. Then open larger forest with *baccharis*, varying to savanna. More and more savanna. Rice & bamboo scattered patches of savanna and forest. Then more of these and less rice.

Then better forest except in low stream valley.

Then large areas of savanna to open forest

resulting from logging & grazing.

Large areas of open to closed forest, all rather flat ground. Patches of *baccharis* spontaneous. Some clearings being farmed, but *baccharis* seems to take over rapidly. Much burning.

Then better forest with scattered clearings.

Pterosphenus tinctorium, almost white crown, very common.

Much of this forest very young and secondary.

Then no more clearings but forest very irregular, possibly from logging. Semi-deciduous. Patches open or semi-open mostly closed or almost so.

Crowns of upper layer separated, but lower layers closed. All of deciduous trees, a short of them, in emergent layer. Here lianas are in lower layers.

No bamboo. *bagastreum* here. Lowest layer has ~~more~~ many palms, but no tall ones. This is a ~~one~~

really vast area of unbroken forest mts on horizon except a little to left of course. Country fairly level to rolling.

More and more deciduous as we go along, but lower layers still green. Country becomes hilly, forest on hills tends to be more evergreen.

This is directly south of Korat. Halfway to us.

Country more hilly now, semi-deciduous to more or less evergreen (on hill). Valleys more deciduous.

Mountainous area mostly evergreen. Very but large trees. Vines in some emergents, but mostly in lower layers.

In valleys the deciduous trees (*Lagerstroemia*?) are leafing out. Hills are evergreen, dense canopy.

Valleys - emergent layer deciduous, mostly, ~~now~~
~~now~~ canopy dense, green.

On mts. emergent layer and canopy green. Many *Pterospermum* in flatter land

but now this area is partially evergreen. Still considerable *Lagerstroemia* in emergent layer.

Large mts in distance to right, very rugged. Course of river relatively, level to rolling country varying locally from deciduous to apparently evergreen.

Now more evergreen, few bare trees or recently leafed out.

Country now between rugged mts larger cleared areas scattered glass & burn.

Limestone range on rt, partly bare, sharp wooded ridge on left. Valley a mosaic of clearings, regrowth, and some good forest. Large areas of manioc. Some young rubber.

Landscape now more open, some new patches of *Melaleuca*, and of thickets of rubber that is fairly well grown. Rubber now and more common.

Mangrove along streams.
Then extensive Melaleuca
swamps. Thickets of small palm. Then, left small sharp
hills, covered by thicket or poor forest, patches of
clearing. Large rice areas and lagoons back
of them. Small patches of coconut.

Low sharp ridge separating

S.E. of Ban Wang

Rice areas, bordered on
sea side by a broad strip
of mangrove. Some
Melaleuca swamps at base
of hills. Mangrove
lines meandering streams.
Borreneria and *Rhexophyllum*
contrast well from it.
Bamboo dense, coarse.

Large flats with no
vegetation but trees bet.
Melaleuca and water.

Mangrove very small
because cut for firewood.

Rice against foot of
hills. Nipa in low spots.
Areas of *Avicennia*, grayish.

Abrupt little hills
with thickets & bamboo
some patches with sedges.

Reach ridge with
Pandanus, forming a
continuous strip

Flooded land, some
dikes for rice, much of
this in Nipa, hummocks,
etc.

Large areas of mosaics
near streams, rice away
from them.

Large rice areas.
High mts. to left
on foot slopes, some
rubber. Villages with
trees, *Areca*, mangosteen
orchards, some coconuts,
all in a small mosaic.
Mosaics. Rubber is apparent,
planted by farmers in small
patches. Some pepper.

Rubber on low hills.

More and more rubber
as foot of mts. is followed
north.

Then, away from mts.
a mosaic of rice and foot.
then forest becomes
dwelling with bamboo
and trees.

Large rice areas,
marshes with sedges
& *Rhynchospora*.

Large Melaleuca swamps.
Rubber on slightly higher ground.

Forest on hills
rubber & pepper between,
mostly rubber, but
small patches of pebb.
Then mixed rubber,
fruit orchards, thicket,
pepper, grass, village,
etc. More and more
of it rubber, but still
some mosaic. Bamboo
thickets and rice mosaic
near stream.

Coppicing operation.

grass, regrowth of
felled bananas, manioc,
rubber, felled forest, mosaic,
much Saccharum spontaneum
low sharp ridge with
thin woods with low
story of bamboos.

Then open land with
thickets, patches of thicket,
scattered trees, scattered
cult. patches. Mosaic of
rubber, thicket, cult. field
Limestone ridge to left.

Many cut & burned patches.
A few patches of standing
forest remaining, but
going fast.

Must have been
country like the country
about half way south
from Korat. Now being

rapidly converted to fruit
and rubber
some of it rather too
sandy.

Scattered tall umbrella
shaped trees left in clearing.
Forest on small hills.
but even this being
cleared.

Beyond hilly area a long
tract of rather degraded
semi-deciduous forest.
Some clearings. Lower
layer very viney.

More and more evergreen
as we go n.w. Rolling
land, scattered hills.
Forest rather continuous
for some distance. Locally
more deciduous in emergent
layer. Very good emergent
layer generally, crowns
separated to locally
touching.

These hills have
deciduous forest, valleys
evergreen to semi-deciduous.
Slender fan palms locally
common. A small palm
is very abundant locally
in lower story & small
openings - possibly a
Engelmannia or a large
Cataglyphis. Lfts. not in one plane.

Very large area where clearing is going on very rapidly. slash + burn, but over 60% of land, then more, and more much von sugar cane in various stages. Stumps still in fields.

Then somewhat better forest locally, then predominantly cleared, planted to sugar and manioc. No forest left, but scattered tall trees.

Patches of bananas and coconuts, mostly manioc and can. Gradual change to rice in low spots. Mt. still or left ^{the} termite savanna.

Mixture of rice + manioc fields. Bamboos along tiny ravines. Still some patches of cane. Village with trees.

Some patches of deciduous wood on slightly higher areas. Soil here looks generally gray and sandy.

Bamboos along ravines. Coconuts, bamboos, some mangos, etc around houses.

Extensive open rice and then extensive mangroves.

and nipa swamps, with coconuts, etc. on higher ground. Mangroves mostly small. Mosaic of kinds.

Large river. Extensive nipa swamps in meanders. Then vast rice fields.

Local villages and coconut patches along canals.

Rice is all stubble now, being grazed by herds of carabao. Apparently not burned here. Ground cracked.

One patch of green rice to left. Many cattle egrets with carabao.

This expanse of rice with either winding or straight canals partly lined with dwellings, + straw stacks, with bamboos and trees, coconut + bananas is characteristic of the Bangkai plain.

These form an irregular gridiron pattern.

More and more scattered dwellings as we approach airport.

Arrived 11:59

May 11 - Hong Kong

Hills of mainland are brown at this season, except for small patches covered by woody vegetation which I daubed. Grass on slopes is generally brown.

Taiwan - passed over, covered almost completely with clouds, but the central mountain range and one to the south and east of it are quite ably clouded. The night was as fresh as the day and with no wind, so that there was considerable snow on the edges and a lot less in the middle peaks.

March 14 - Kilaeua, caldera 3050'

flor of Halemaumau Pit

on lava covered by layer

of small pumic fragment

45138 *Coreopsis*

locally common in
meadow-like patches of
vegetation

42 39 *Potaria geniculata* (Lam.) Beauv.
common

41 40 *Chenopodium ambrosioides*
very local

43 41 *Rumex giganteus* Ait. ex Rein.
locally common

42 42 *Bidens pilosa* var. *pilosa*
locally common

43 43 *Pennisetum napellii* Stev.
locally common

~~44~~

Mar. 14 - Volcano Observatory
Kilaeua

45 45 *Lepidium*
locally common

March 14 - Kilaeua,
upper end of Bird Park Road
along roadside

46 46 *Oenothera*
common

3050'

930 m

much branched at
base, ~~into~~ forming
clumps, flowered yellow.

leaves erect, glaucous
on ~~dark~~ surface.

stems spreading,
slightly ascending,
strongly aromatic.

much branched
bush up to ~~to~~ 0.7 m tall,
flowers pale green.

stems elongate, sprawling,
heads orange, completely decid.
dense clumps up to
1 m. tall, panicles purple.

4050'

1247'

erect, stems thicker
toward base, petals white,
conspicuous

4050'
4050'

1235

branched at base, not much
above, old plants to 1 m. tall;
flowers bright yellow, with
slight, rather unpleasant fragrance.

74 1964 Hawaiian Is

Hawaii - Hawaii Vol. Park 75

45147 *Asplenium adiantum-nigrum*
under bushes, rhizome
deep in lava crack

48 *Desmodium trifolium* (L.) DC.
common

49 *Kypericum digenoides* T. & G.
common

50 *Graptoleium*
locally common

51 *Couyga canadensis* var. *williamsii*
common

52 *Desmodium* ^{intotum Mill.} *undulatum*
common

53 *Cyperus*
local

54 *Chloris gayana* Kunth
rare

March 15 - Kilaeua,
National Park Reserve Area.
around houses

55 *Oenothera*
probably planted

56 *Eschscholtzia californica*
planted

March 15 - Kilaeua, just
above Kilaeua Military Camp

57 *Lupinus*
established along road

sterile

forming a thin mat;
flowers yellow.

plants pale green

(With) long, flat bright green

(Jacq.) DC. clumps, branched at
base, stems decumbent
to ascending, flowers
blue purple.

3940'

1305 m

decumbent branched stem.
flowers yellow, stigmas 4.
large much branched
herb, petals orange,
paler distally

4000'

1220m flowers light blue,
standard with white
patch in center

Mar. 15 Clean up Lantau Rd.
bet. 1 + 2 mi. above Kokosan crater.

Trans. 100 trees, 100 others
trees over 8 m tall. 1/3 of them
were dead or had brown
dead parts. Most
only partially dead
but not dead - many
another 100 tree transed
same area had 15 trees
affected 5 of them dead
or nearly so.

This is an open to semi-open
lehua forest. Trees up to
20 m tall. (4 photos - b & w)

A few small Acacia box
These with Trentepohlia
conspicuous on bark.

Along road bet
Kokosan crater and
Alo'i Hot spot there
are usually dead or
dying trees in
sight at any time.

Alo'i Hot spot has
so much gleam that
usually there is almost
no visibility beyond
a few m. although
this shifts a good deal.
A steady rain is
falling intermittently.

Yapau trail -
just below Palm factory
An area of young sparse
Metrosideros - Now the
leaves that were unfolding
in Nov. are mature but
still the foliage looks
sparse. All Lycopodium
carninum ~~stev~~ present at
that time. ~~is~~ dead at
tops, at least, but now
vigorous sprouts are
abundant.

Just below this are
many dead grounds of
Gleichenia, but vigorous
newer, immature to
fully mature ~~one~~ ones
are abundant.

A bit farther the Machaerina
has many dead or partly
dead leaves, but also
many young healthy
ones. Some of it is flowering.
Damage to Lehua rapidly
becomes more striking -
seems more so than I remember
from Nov.

Machaerina colpodes
shows about as much
damage as M. angustifolia.
More and more dead
Gleichenia grounds, but
just above the first

May 15 - Chain of Craters Rd. just above Kokoehau Crater.

In open Metrosideros forest.

- 43158 *Gahnia*
very common
59 *Tricholaena rosea* Nees
rare in open place.
60 *Tentropeltis*
on bark of Acacia box,
but not seen on
Metrosideros

May 15 - Chain-of-Craters Road,
Alo'i Hot Spot, near
Alo'i Crater
on Hot ground with steam
cracks.

- 61 *Ageratum conyzoides* L.
occasional
62 *Pistotum nudum* (L.) Beauvois
occasional
63 *Digitaria*
rare
64 *Euphorbia thymifolia* L.
very common
65 *Fimbristylis*
rare

May 15 - west edge of
Napau Crater

- 66 ~~66~~ *Peperomia*
in gulch running down into
crater.

(to 0.88)

3690'
1154m

small tuft

bright orange color.

3175'
980m

dark purple.
almost dead, rhizome
rotted away.

very prostrate
culms prostrate

2700'
825m

stems erect, dark red;
leaves fleshy

steep place in the trail about half the ferns are dead, half green.

Ground here is open. Beginning here the recovery of Lycopodium is more advanced. Here is open mixture of grass, sedges, & Lycopodium. *Fernaria*, *Mitchella*, *Asplenium*, *Hedysarum*.

The *Lycopodium* leaves are mostly dead. Only the young stalks have leaves & are green.

The flat ground at the bottom of the slope shows much less damage than the ferns than the slope itself.

Saxifrage green & apparently not much injured.

Below the path in the trail the forest is much taller and for a short distance, something shows more less damage. Some dead host or *Lycopodium* and slender little else. Then *Mitchella* *Metrosideros* is now many leafless bushes but

and quite a few almost leafless trees. These have dead bark. Many of them in an area to the left of the trail.

Then a stretch of tall forest showing very little effect.

Then the area with tall ferns and an understory of *Cibotium*, extending to the crater. The tree ferns all have 1-3 very healthy full size fronds.

Lycopodium here shows no sprouts near the crater.

Salpingella

Epiphytes - *Hymenophyllum*, *Rhipidoglossum* ~~spec.~~, *listeri*, *Peltatum* *copl.*, *grammitis* *terrenum*, all dead. *Rhipidoglossum* *reticulatum* healthy and unaffected, except very near crater, where some browned. *Mosses* & *hepaticas* dead. *Polyodium peltatum* healthy.

Coprosma gouldii, *Alyxia uniflora* unaffected. *Broussaisia* putting out

new sprouts grown
dead-looking trunks.
Vaccinium and *yerba-mate*
healthy.

Frosted *Hypothecium*,
young & a late ill
brookleaved many green
all abundant & healthy
baccharis healthy but
less abundant. *Palopodium*
abundant & as abundant
still, but healthy.

Vaccinium distichophyllum
damaged but starting
to grow again even to
ends of the apparently
dead internodes.

In crater edge *Staphelia*
that looked pretty dead
is sending out some
healthy sprouts from some
of the branches. *Coprosma*
erubescens on edge somewhat
damaged but recovering well.
Rubus scabria flowering
abundantly.

Cytisus polystachyos
& *C. revolutus* damaged
but well covered

Schizandra on cliff shows
only rather new leaves
but is not much injured.
Well over into forest &
right most epiphytes.

are dead, but small
plants of *Belasinnella*
merginiis, several cm. tall
are appearing in abundance
on some tree trunks & on
ground.

Even over to edge of gully
mosses & hepaticas are
all dead, as well as
most other epiphytes,
except *Cladonia* etc.

Velutaria strophocar-
moides is injured ~~etc~~ in
that old grounds are dead
and edges of patches of
young ones are dead.

In gully most but
not all epiphytic
growth of bromeliads
dead. Few ferns have
bonds that are partly
brown but not dead.
Belasinnella not dead
but partly brownish.
If seed plants & such
show some injury but
is recovering.

Coprosma, *Gaultheria*, etc.
not flowering but healthy.

On new lava or crater floor not a single sign of new plant leaves off Metrosideros blown over surface and lodged in depressions in some number.

Small bushes that showed no life in the NW.

Now has seedlings of

- 9 *Erechtites valerianifolia*
many small bracts & strobophylls, 1 mm
gray, tiny ~~white~~ *Machaerina angustifolia*
- 1 *Gnaphalium sandwicense*
- 8 *Rubis rosaceifolius*
- 1 *Andropogon virginicus*
- ~~1~~ *Carex*
- 1 *Comella bonariensis?*
- 1 *Senecio sylvaticus*
- 4 *Cipturus* (red veined)
- 1 *Cyperus* cf. *polystachyos*
midrib (opp. smooth, obtuse, fine
lvs to 1.5 cm. l.)
- 1 *Pluchea odorata*
- many ~~1~~ *Dubautia* cf. *seabra*
(very tiny, unsheltered spot)

All, except 2 or 3 *Erechtites*
are on old peaty soil
lying on older lava.

Tiny satellite cinder
just w. of large one.

One Metrosideros bush
apparently dead but showing
a few tiny sprouts at base.
Another shows no life at all.

3 Erechtites seedlings, no
budding 25 cm. tall.

1 *Pluchea odorata*, 10 cm.
many *Machaerina angustifolia*
up to 1 cm.

a few very tiny *Hypericum* (?)

In very sheltered place
on lava, tiny fern sproutings
and gasterophytes

A few patches with sparse
tiny moss plants.

Kipuka itself - looks
perhaps a bit drier than
before, but most plants
showing recovery except
Lycopodium cernuum. No
sprouts & living stems seen.
Machaerina alive but
not flowering.

Vaccinium reticulatum
flowering.

Dubautia seabra flowering
abundantly.

Glyphaea mostly sending
out some new sprouts.
Around scorched periphery

on N. side many settings
of *Cochlearia valerianifolia*
and *Saxifraga bronchialis*

5 ft. up

4-5 Patches

Many tiny *anthoxanthum*
seedlings & seedlings.

A narrow flow of crust
was north of Makrophihi
is a line of steam
vents with small
sulfuric crystals
on rocks.

At top of cliffs the
cinders across flat
onto an area of sparse
dwarf *Luzina*, mostly
dead or nearly so.

The *Gleichenia*, grass,
etc. are brown and
dead in a spotted
pattern. *Andropogon*
and *Gleichenia* form a
dense mass. Clumps of
Machaerina are mostly
still alive. Locally, *Gleichenia*
also, but most of the
vegetation in a space of
several acres is dead. It is
recently enough dead so
it has not yet disintegrated.
Fumaroles are numerous
in the area, some of them,

producing jets of
steam that is uncon-
fortably hot. The
Syzygium here is
all dead in the hottest
area but in those
which were green
vegetation remains.
The older stalks are
dead but there are
green new sprouts.
The gas is smaller &
bit sulfurous but
not strong, so what
must have happened
is that the concentra-
tion of SO₂ here was
never as high as it is
in the most affected areas
point to the south. Where
the temperature was
very high, the roots
were killed. Where not
new shoots were
produced.

On Napan Trail, about 30 m
below Makrophihi lookout
very near Makrophihi crater
is a spot where the air seems
wain. The *Gleichenia*, here about
3 m. deep, is dead over an
area of perhaps 50 sq. m.

March 15 - Napau Crater trail
 70. 6 m. about half way from
 M. 72 Mahapuhi Crater to Napau
 in Metrosideros forest

- 451 67 Coprosma
 common in gully
 68 Coprosma
 common in forest or flat

March 15 Napau Crater
 Trail, about 0.75 km
 above crater.

- 1 69 moss
 on bare old lava rock.

March 15 about half way
 between Mahapuhi and
 Napau Crater, on Napau
 Crater trail

~~20 Hypoptochia~~

- 1 70 ^{Phlebopodium} Hypoptochia ^(= Haplozia) fol. linearis ^{var. 1}
^{det. S. P. Smith} rare, epiphytic on tree trunks
 71 Psilotum complanatum var. 1
 occasional, on tree trunks
 72 Psilotum ^{det. S. P. Smith}
 rare, on mossy tree-trunks.

March 16 - Puhiuan Crater,
 Chain of Craters Road

- 73 Astelia
 occasional in open
 Metrosideros forest on lava.

2700' shrub 3 m. tall sterile.
 unaffected by sulphur fumes.
 825' m. shrub 3 m. tall, sterile;
 unaffected by sulphur fume

2825'
 860 m.

2350'
 870 m.

nearit

700'
 1027 m.

large rosette,
 rhizome ~~edge~~ ^{to} several
 dm. long, leaves spirally
 arranged, 3-ribbed; fruit orange, fleshy.

Mar. 15-16 Chain of Crater Rd. Dead trees, especially few near Crater Rim Rd. becoming more common down chain of Crater Rd. Many at Pukitoroa, some all the way to Matanopuhi.

Mar. 15 Napan Crater trail - some dead or injured by *Euphorbia* back to and beyond Pulau Factory, but the number becoming less in proportion to total till impossible to distinguish from normal occasional dead shoot.

Pig damage very conspicuous almost everywhere along trail

At Pukitoroa much pig ~~tree~~ rooting across road from Crater

Much *Euphorbia* species here quite normally

Of 3 trees 1 m. or more tall along crater rim in parking overlooks, 3 are dead. Others OK.

Mar. 16 - Pukitoroa Crater Around west side of crater more dead than living *Metrosideros*.

Check on 10 numbered trees looked at Nov. 24, 1963.

3. Certainly far less than 1/2 of twigs still leafy, prob. more nearly 1/10. leaves more brownish red than green. A few small new sprouts several cm. long, the leaves on these pale yellowish green.

2. Essentially same as in Nov. but many twigs show up to 5 cm. of new growth, this rather pale green.

4. About as in Nov. but almost all twigs have put out a few cm. of new growth. Galls on leaves very numerous, even some on new growth.

7 Essentially as in Nov., but most branches have put on new growth, some as much as 10 cm. this tending to be pale and reddish, but not so on all twigs.

6. About as in Nov. perhaps more leaves reddish or brownish, a few cm. young growth, ~~and~~ many twigs, buds & some others rather large, galls

abundant even on new growth
 #5 Essentially as in no.
 but generally a bit less
 healthy. Leaves tending to
 be splotched or ~~variegated~~ older
 ones turning red. Young
 growth on ~~many~~^{most} twigs but
 but tending to be red,
 dwarfed, distorted, galled.

#8 A considerable number
 of leaves have turned brown, a
 reddish, esp. on lower and
 middle branches. Some
 twigs have young growth
 up to 5-6 cm or more long,
 some of them a bit pale, but
 mostly healthy. Many
 branches with well grown
 flower buds, several infls.
 just starting to flower.

*9 All leaves now dead,
 some still persisting on tree.^{Widow}

*10 Still rather healthy
 looking, fruiting, one or 2 infls.
 still flowering; abundant
 new growth, rather pale
 but on upper branches
 healthy looking, on lower
~~branches~~ branches reddish,
 on one basal shoot about 3 m
 tall, the young growth very
 dwarfed, also galled. This
 shoot has leaves a bit
 brownish, not as healthy

looking as upper parts of
 tree. Lower short from
 base is reddish-yellow green
 and has little new growth.
 Looks unhealthy. Another,
 smaller, has a rather
 reddish appearance but
 has young growth, thus reddish
 leaves of lower branches of
 this short turning red
 on lower parts of twigs,
 and even somewhat on
 upper parts. Extreme
 upper twigs seem not too
 healthy. Leaves rather small,
 not much young growth.

No. 1 seems to have had
 tag stolen. The tree that is
 most likely it (large one
 nearest lookout) looks
 about as described in no.
 Has one of large lower branches
 completely dead. Most twigs
 have 3-5 cm. young growth.
 leaves on this tend to be
 small, somewhat pale,
 tendency to be reddish.

Two transects of 100 trees each,
 roughly parallel, across
 road from Pubimian crater
 perpendicular to road, had
 of trees to 5 m. or more tall 32 + 28
 dead or badly diseased trees.

94

95

May 12 - Alos Hot area

List of plants seen in active steaming part.

- a *Lobelia cyathia*
- la *Andropogon virginicus*
- la *Euphorbia thymifolia*
- c *Waltheria indica*
- c, la *Cyperus polystachyos*
- c *Fimbristylis*
- c, la *Nephrolepis*
- lc *Digitaria*
- c *Baccharis contracta*
- o, lc *Ageratum conyzoides*
- c *Pileolum nudum*
- o *Fernaria cinerea*
- lc *Pityrogramma calomelanos*
- o *Gleichenia linearis*
- c *Anundina*
- la *Gleichenia linearis*
var *tormentosa*
- c *Metrosideros collina*
- lc *Paspalum orbiculare*
- o *Euphorbia hirta*
- la *Spathoglottis articulata*
- * o *Psidium guajava*
- la *Strophelia tameanae*
- c *Psidium cattleianum*
- o *Stachytapheta dichotoma*
- a *Couya condensis var. pusilla*
- o *Cuphea carthaginensis*
- o *Lycopodium cernuum*
- la, ~ *Sphenomeris*
- ~ *Pteris*

— *Dipteranaceae*

- ~ *Spathoglottis plicata*
- o *Mashalina angustifolia* (per.)
- ~ *Grapholium purpureum?*

Much of ground bare or with scattered Fimbriostylis + cyperus. Around steam vents Euphorbia thymifolia tends to be abundant, except the hottest ones, which have no plants close to them. Sphenomeris is abundant near some vents, but always very dwarfed.

Patches of Gleichenia mostly partly dead, except in peripheral areas.

Metrosideros 1-2 m tall, mostly dead or partly dead. Other shrubs only in peripheral areas.

Hypopodium cernuum where found, although tending to be dwarfed and sterile, shows no tendency to be killed as by sulphur fumes.

The hot area has obviously been extended recently, as there are areas of well developed vegetation that are cooked and dead, esp. along some long recently opened cracks on right (west) side of area.

harmonious checked
temperatures and found
85-86°C in two vents. Soil
almost as hot immediately
adjacent.

Cladonia cf. *rundifera*
locally abundant in
otherwise bare zone. Basal
parts appear cooked in
some places.

The central areas are
largely bare, or with very
depauperate vegetation.
Peripherally ~~are~~ are large
patches of *Gleichenia*,
Nephrolepis, clumps of
Machaerina, *Psdium cattleyanum*
etc. Around new vents this
may be brown and dead
or mostly so. Near the
steam vents *Euphorbia*
thyrsifolia and *Sphenomeris*
are locally abundant.
Fimbristylis, *Cyperus*,
baccatula, *Digitaria* ~~l~~,
Vernonia, *Ageratum*, *Congya*,
Cypera, *Paraphamum* tend to
be pioneers in bare areas.

March 16 - Alor Hot Area 3^{178'}

Chain of Crater Road
in open ground, hot
from numerous steam
cracks and fumaroles

3^{178'}3^{178'}

- 45174 *Sacciolepis contracta* (H. A.) Hitch.
common
- 75 *Waltbeisia indica*
common
- 76 *Pteris*
rare, near fumarole
- 77 *Cladonia*
locally abundant
- 78 *Cladonia*
very local
- 79 (algae) *Stigonema*
abundant on bare areas
- 80 *Nephrolepis hirsutula* Forst.f.
abundant
- 81 *Paspalum orbiculare*
common locally
- 82 *Lphenomeris linearis* Nash or Lema
abundant locally

prostrate shrub, over
1 m. long, flowers yellow.

fronds erect
culms erect or ascending.
all seen were dwarfed.

Ward T. Bayard

Teratophyllum californicum
Leptosiphon californicus
got it on my visit, the
former extending -
between scattered -
The siliques are about
1 cm, the sp. at the
point of fruiting at about
100 mds. in the Hill
mesano vegetant of the
area is a top of st. &
one side of the vegetant
the point of maximum
development fruit, a slender
pedicel about 1 m. long
with 2 bracts about 1 m.
below 2 bracts of a small
secondary lead. The lead
much smaller than main
but otherwise normal
appearance and place in
the vegetant were
mainly above the
fewer than one met. bands
coming from the vegetant
interspersed among the
floriferous 11-12 and some
peduncles grows about 6 m in
size long, about 2 dm. in
diameter, there
small bracts, there

in the one with 3 bracts
arranged like without
crown, the secondary lead
smaller - there 2 bracts
are smaller than in the
also. The above larger
about a few days later
the ligule is thin
as well as the secondary
obscure at antem
greenish. The small
leads another part of
the leaf-like bracts are
to 100 peduncles above
the leads, these at time
when the a small plant
in the small leaf-like
main peduncle at
the base of the siliques
through the axis and
several axillary bracts
in case of leaf-like bracts,
are often up to about 15 mm
long, strongly incurved.
Each secondary lead with
a capitate bract, often
in middle of vegetant.
Also each floriferous node
and back embayment of the
axis of a small leaf-like
bracts.

air way to town. 100' elev.

Mar 19 - San Joaquin hills
at end of belt of trees
from river's headwaters
have been cut down
at vegetation, but
the soil is still moist - some
fairly large trees
and stumps in line
and even along sides
small scrubby mountain
scrub - there are still
patches of woodland
land. This is all black
soil and the country
should be forested but
when cut it becomes

~~High River~~ - Remained in the
evening and went to
the town of Visalia.

High River has
considerable snow - On
further part of way rather
scrubby - road largely
dry, unusually many
seems to be old stone
scraped up - probably
of rather exposed ground
but a great part of it is
actually dry.

Railroad runs in valley
part in one of the deeper
valleys and even though
slopes and ravines cut into

Paved roadway over Mtns
is the steeper seems to be
all one material. To east
is a large sand hill
with white topsoil. To
concrete a road where there
was a substantial distinction
from present - show.

Slopes gradually
approach a west
end of hill, south, open
scrubby groups of wood
extending a considerable
distance to east before
there is evidence of
appreciable soil moisture.
About road they get a
few small trees.

Soil here follows a basin
north of them a few
steps above area of desert
bottom. There very soon a
new highway comes in from
north. Then the transition.

Highway crosses road all often
at base of a steep mountain
expansive but small. It seems
to have little distinction -
a small dry lake with

then an extensive wash
flat, but cut by numerous
ravines. A small town with
an orchard - Templeton. Off
this a strip of orchards.

Then first descent into valley with coffee,
then a broad valley,
a very bright sun.
Then a great flat valley
overcast. Then a
low point with some
forest and blossoms and
some grass above from
bright, dry flat, no
soil, composed of lava
etc. Then a large
area of dry lava
flat and yellow soil
completely dry soil
and over all of straight
bushes.

Then a series of large
mountain areas with
considerable vegetation
and then a road.
This is a great area
with many, small, jags
of a, trending east and
getting higher and, more
irregular. A tall wall
of lava rising and
and some smaller ones.
Most of this is a very
large area of low lava
but, and is flats,
then a rock, now with
patches of grass, a
small creek down the

as and along it, but
the road is. Then to
end of it.
Area of medium altitude
surrounding a dry basin
a road across the end of
basin.

Next valley has a
strip of road, but a
smooth, undisturbed
then small with small
traces of man, very
thin forest.

This is main road and
leads a little agriculture
large about fields and
a narrow, not open
well extended forest.

Parallel to road running
indistinctly north.
The vegetation shows
the road extends so
far as of trees. But
visibility.

In half dozen or so miles
a man's house comes with
some more plants along
road. Then a very long
dry basin out with
a number of smaller
Then a road, not many
with some more, grassy
narrow, extending down to
sea. Long valley with man

- 1680 - sand and small
gravelly surface soil
and some fine sand.
1681 - very light gray
soil upland
1682 A large area of coarse
desert basin soil with
evidence of erosion but
much of surface remains
undisturbed.
1683 - thin soil layer
with a few rocks.
- no soil in streambed
- all some vegetation
existing here is not quite
mesic and so distinct
canyon country has
been large areas with
water and sand and gravel
1684 - very agricultural country
- large areas of topsoil
Dinner

mainly - about 10 feet
high when full
in blossom. Many
of them have
the stamens all
yellow, others
have some maroon
stamens. Some
of them have
all yellow stamens.
The flower stalk
is at least 10 or 12
inches long.

On the steep slope
where the soil is
poor there are
several other forms
of Erythronium
which have shorter
stems and smaller
flowers. One has
the petals all yellow
and the stamens
all maroon. Another
has the petals
yellow with maroon
blotches at the base.

April 15 - Bull Run found
small colony of *Erythronium*
americanum on flood
plain

perhaps 100 fls. petals yellow,
annulate at base, sepals
not both sl. marked
with maroon near base,
stamens all yellow,
3 slightly shorter and
smaller, but irregularly
so. Colony uniform.
(45183)

In same small flood plain,
but away from river bank
another, smaller colony
of 30-40 plants, similar but
all stamens maroon
somewhat more differentiated
in length. (45184)

On the steep slope above
both clones are present
stamens yellow 31-1-13-6-2-3
stamens maroon 30-1-1-1-10-5-2-18
but here there may be several
clones involved, as some
with maroon stamens have
maroon blotches at bases of
sepals + petals. Some of both
have larger and much
more differentiated stamens.
One clone has different shaped perianth -
ovate acute (45186) others mixed (45185)

Apr. 15 - along west bank of
Bull Run at Lomond
~~on flood~~

- 45163 *Erythronium americanum*
locally plentiful on
flood plain
- 89 *Erythronium americanum*
locally common on flood plain
- * 85 *Erythronium americanum*
common on steep slope
above flood plain
- 86 *Erythronium americanum*
very local on steep
slope above flood plain
(with # 45185)

Apr. 17 Bull Run, west bank
where Rt. 66 (Interstate) crosses
flat wet area in
thin woods.

- 87 *Erythronium americanum*
local in
- 88 *Hedysarum occidentale* (?)
local along old road in
- 89 *Erythronium americanum*
local in

leaves mottled, flowers yellow,
slightly marked with
maroon in center, anthers yellow.
— leaves mottled, flowers
yellow, slightly marked
with maroon in center,
— anthers maroon.
mixed clones, more or
less maroon at bases of
perianth parts, anthers all
yellow or all maroon.
— perianth parts ovate-
lanceolate, anthers

perianth old rose without,
anthers deep maroon.
— limb of corolla lavender,
eye yellow.
perianth old rose without
anthers yellow.

April 23 - west side of Bull Run just where Interstate St. 66 crosses
Wet flat, second growth woods.

Erythronium common but not abundant.
2 forms, but not growing together, one with maroon stamens (45187) the other with yellow, neither strongly differentiated.

Dentaria laciniata abundant.

Cystopteris fragilis in patches, sterile.

- Flowers were
- Claytonia virginiana*
 - Dicentra eximia*
 - Dicentra cucullaria*
 - Dicentra spectabilis*? (on cliff)
 - Corydalis flavula*
 - Nepeta heterodon*
 - Viola rostrata* var. stellata purple & white Vicksburg smooth stemless yellow and *Lindernia benzoin*
 - Ceris canadensis* (just opening)
 - Taraxacum vulgare*
 - Crabus* cf. *laevigatus*
 - Isopyrum cristatum* (almost past)

April 24 - C & O Canal between Paw Paw and Little Orleans. Except for tunnel and cut through mountain at Paw Paw the canal runs along the outer edge of the flood plain of the Potomac, at the foot of the shaly bluffs and slopes of the Appalachian where the river cuts through them.

The forests down on the flood plain are poor second-growth deciduous bottom-land forest, mostly rather recently abandoned from cultivation.

Amelanchier cf. *arborea* is very common in full bloom. *Acer negundo* is also in bloom. No trees are very far along in leafing out.

Great masses of *Mertensia* on alluvial land make a wonderful show. An occasional plant is pink.

Cypripedium locally abundant but not a single one in bloom.

Alliaria common the whole distance, young buds only.

On the bluffs the forest is largely pine (long. *P. strobus*, *P. echinata*) some *Juniperus virginiana*. Lower slopes largely deciduous.

Cornus florida is usual absent along this street, one or two plant seen, not yet out.

In patch of *Alexis cordigeri* area, found

On steeper slopes *Acer negundo* s.l. is common, in conifer flower the flower is pendent, light pale yellow.

April 26 - 2 mi. from Stony Point Albemarle Co.

Paschal Reserve

Mixed second-growth hardwoods at upper end

Ostrya virginiana (?)

Fagus alba

Liriodendron

Carpinus caroliniana

Acer rubrum

Cornus florida

Pinus echinata

Pinus strobus

Podophyllum peltatum (?)

Aplectrum hyemale

Tipularia discolor

Uvularia perfoliata (?)

Viburnum acerifolium

Lomax glaucus

Rhus toxicodendron

Allium vineale

Galium trichotomum

Amelanchier

Sonicera japonica

Prunella vulgaris

Viola (?)

Galium oblongifolium

Kalmia latifolia

Corylus (?)

Hedysarum caeruleum (?)

Dianthus spicata

Chimaphila maculata

Polystichum acrostichoides

Stellaria pubera (?)

Ceras canadensis (fl.)
Lindera benzoin
Gaultheria procumbens
Asplenium platyneuron
Ranunculus abortivus (?)
Cypripedium acaule
Bryophyllum virginianum
Osmunda cinnamomea
Cypripedium virginianum
Dentaria laciniata (fl.)
Polygonatum biflorum
Urtica dioica partim (fl.)
Fragaria virginiana (fl.)
Euonymus
Pyrrola rot. var. acerifolia
Decodon verticillatus
Lycopodium complanatum
Alnus serrulata
Belandanda
Pinus virginiana
Bassaris albidus
Goodyera pubescens
Senecio aureus (fl.)
Smilax rotundifolia
Oreobis spectabilis (fl.)
Viburnum prunifolium
Fagus grandifolia
Smilax glauca
Quercus falcata
Senecio f. paniculatus
Parthenocissus quinquefolia
Achillea millefolium
Rubus cf. arguta
Rubus idaeus

Fragaria americana
Prunus serotina
Lemna officinalis
Aquilegia
Vitis
Hippocratea hypericoides
Viola reichenbachii

White pine is on a gentle west slope - several scattered large trees with a large number of seedlings and saplings around, some scattered rather far into the surrounding forest. One of largest is over 2' dbh. These large ones are scattered along a small gully.

120 ~~1964~~ Virginia

April 26 Fernbrook Natural Area

2 mi. Stony Point,
Rivanna River

Mixed deciduous
second-growth woods

45190

Carex

occasional

91 Ranunculus
rare

92 Lysimachia

occasional

93 Hedysarum caeruleum
locally common

94 Uvularia perfoliata
common, occasional

large colonies

95 Viola papilionacea Pursh
common

96 Tipularia discolor
rare

97 Aplectrum hyemale
occasional, locally common

98 Ostrya virginiana L.
rare

Albemarle Co.

121

small tufts

flowers yellow

small tufts

representing a colony in
which 5-merous flowers
~~are~~ and 3-merous flowers
are occasional, usually
on same plants with 4-merous
rhizomes slender, white;
flowers yellow, pendent.

flowers purple

leaves deep purple beneath,
plicate

leaves purplish green
with conspicuous white
nerves

small tree about 10 m. tall.
dark shreddy-flaky

May 2. Miami to Homestead
via Old Cutler Rd. a dirt road.
Several patches of
pines have been
burned. The young
seedlings are dead
but apparently continue
to regenerate. The young
seedlings are small shrubs
but palm and leucaena are very
fire resistant - stand out
leaves only a few days
after burning. An
area burned a year or so
ago has an almost complete
stand large of stemless
palms. The fire is needed
to preserve the character
of the fields.

Rest s. of jet. with *Hibiscus*
Sparrmannia *Pithecellobium* *indica* and
P. odorata both along roadside.
Not certain, possibly *Baccharis*,
Albizia lebbeck seems to
be naturalized.

Bulldozed pine-land
at fallowed after cultivation
grown up to a solid wood growth
Chamopodium sp. alluv.
Oenothera ^{seeded}
Portulaca
Ridleya odorata ^{seeded} *Valerian*
Eupatorium sp.
Onobrychis

A new variety of *gordonia*
has been missed. It
introduced from *Cuba* - it
of course partly it willably.

seed saved for 3 years
fallowed for 3-5 years.

~~seed saved~~
For wild rice grass
that I saw I can guess
the equivalent here of
been burned recently -
scrubby *Acacia*.

Where no burning for
10-15 years a thick lot of
Croton sp. and *Mitchella*
Ziziphus *Crataegus*. *Chapotolana*

Q sand is spilt limestone
with intertices filled
with peat. If given rain
when water table is down
the peat burns out.

Non needle-leaf have very
thick bark covering base.
stem appears conical fine
dots not seen then unless
too strong. Valguello is
surrounded by dead trees
exists fir. Probably the
amount of water absorbed
has something to do with

The survival.

"Grotto" hole, a depression in limestone filled with water -

sometimes 2' deep. May be open, surrounded by Thalia, or wooded with Salix and other wet-land hardwoods.

Where surface of filled limestone is substantially higher there are down-mucks of different hardwoods - Syzygium, Pouteria, etc., Guadua, Agave.

Beyond "Rock Reef" is low grassy area with scattered dwarf casuarina & 1-2 m tall. Apparently stands as clumps of much taller ones. These never seem to get much farther from a practically sea-level. The taller patches are, unless they are into gullies with great 2' H. mud.

Where land rises to 0.5 m. el. tropical hardwoods - hemispherical trees, or a few small bunches

This often different lot, where it is... pine-land and hammock.

Vegetation pattern - empty cut lots, slight differences in elevation.

Wet Rhizophora scattered over wide area about 1' tall. Here there is about 2 m of sand on ~~the~~ rocks.

Where there is a dense stand of Rhizophora 2-3 m tall, the marsh with some heat, is 1.5-2 m deep. Some heat under tree root.

Where the marsh is very shallow, isn't no mangrove. If here even a tiny clump of mangrove there is a depression with great

question is whether holes are necessary for survival of mangrove seedlings - or whether mangroves keep out the roots.

The earlier area is covered in a mat of root-excreted filamentous algae - this dry now and fragmented into 5-cm pieces.

On right side of road 1 m. mangrove almost

continuous, on left,
very scattered.

~~Scattered~~
little on the road.
They are more abundant
even on left.

"Pig heads" a of framework
mortified rock - patches
of wood about $\frac{1}{2}$ - 1 m tall
with one depression
in the rock beneath
but with a mound
of peat up to 70 cm
above surface of road.

Now on savanna. Found
the following: clay
causes *Clayrobalans*,
Trigynis, *Myrsica*,
Melastoma, ~~Litsea~~ *Vitis*,
Colubrina.

Pithecellobium scattered (little
or no regeneration on
young ground.)

^{abundant} *Euphyllia* *Burttiana*,
Catopsis and several
^{abundant} *Tillandsiae*, *T. balbisiana*.

The whole surrounded
by a ring of mangrove
that has much taller
up to 4 m than the dwarf
ones on the marsh. This ring
is on the edge of the peat.

Around this is a depression
in the marsh, probably
dissolved out by acid seepage
from the peat accumulation.

Three-mile Bend - old
iron pot filled with
water. The water is
boiling and has a
~~black~~ *Mangrove* mud
in the bottom. The
boiling is so strong
as to cause great
steam.

Beyond this there is
nothing, the land is open
scrub & scrubland.

On left, many patches
of sand grass pasture on
right practically none.
Then a ridge of peat
covered by *Condalia* *sp.*
thicket, perpendicular
to road.

The area where
Hurricane Ionna killed
Rhizophora and *Conocarpus*
is replacing it.

Pond filled with
jelly-like peat, considerably
by marsh. No mangroves
started yet.

Red, black & white
mangroves killed where
marl layer deposited
on substratum by Hurricane
burned along natural
margin, on Indian mound
etc. Corocarpus remains
except in Conch spot
where they were killed, too.
Cayenne pepper plants in
Hurricane the mangroves
root were pulled off to
level of marl.

In areas where everything
was killed a scattering
of seedlings have now
established themselves.
After Hurricane the
seedlings were abundant,
but several dry years
caused death of most of them.
Locally some surviving.
A layer of marl covers the
entire area where the
mangroves were destroyed.

It is known that
areas caused by charred
burning, farmland, etc.
Burned land covered
there with marl, Corocarpus
coming up in quantity,

with halimnia, Littoralia
in Florida Bay or among
shore banks & between the
marsh flats. Laughing gull,
red-wing blackbird, tern

start plants on
flat back of beach -
Heliotropium in association
of portulaca deminutum
Biden gelosa -
desirous portulaca
dulcis.
Alternanthera
various of
halimnia

Florida Bay boat trip 3 days
Mangroves, flock of pelican
in channel, Avicennia
along channel, grass right across
Passed Joe Rock Key - most
of woody vegetation dead,
some trees alive on periphery.

Palm Key

Avicennia on beach ridge
in south end, a few big palms
rest in the grass thrown
up on beach ridge on
ridge of shell sand - not
more than 20 cm above water
Sugar palms 9 ft without fronds

List of plants on
Bell's Key

- Alocasia glauca*
- Batis maritima*
- Sesuvium portulacastrum*
- Calystegia soldanella*
- Withania solanifolia*
- Zaluzecia speciosa*
- Gramineae*
- Panicum amaracana*
- Alternanthera*
- Borrichia frutescens*
- Portulaca oleracea*
- Randia aculeata*
- Melastoma*
- Glycine max var. lutea*
- Ipomoea batatas*
- Ludwigia linearis*
- Solanum elaeagnifolium*
- Chenopodiaceae*
- Common grasses & weeds
- Cyperaceae*
- Glabraria hexamita*
- Euphorbia*
- Plantago*
- Urtica*
- Listicthlis?*
- Many trees & shrubs
- Fatalogyne*
- Combretum spicatum*
- Common species of palms
- Erythrina corallinae*
- Hedysarum pacificum*
- All galumphs

On west beach ridge marsh,
dry sandy plant.

Top of flat of firm black
soil, then soft soupy
gray sand with some shells.

Inner flat with broad
Salicornia belt, etc. with
spots of bare sand with
no vegetation.

Heath top 2-3 ft. is very
stiff marsh, then soupy marsh.
at bottom (3 1/2 - 9 ft) a thin
layer of peat. Then rock
a few scattered small
Salicornia on outer belt
of this flat.

On most of this flat
there is a thin layer of marsh
deposited by tides.

In some areas, near
peripheries of flat, are stands
of *Borrichia* with scattered
small stiff patches of *Randia*
& *Martynia*.

Locally stands of *Graptis*,
varieties of *Borrichia* and
Baths do hard to go through.

The interior is normally
a shallow lake, now dry
because of abnormal dry
year. Then one over. in
submerged part. Most
closed scrub dwarf scrub or
dwarf island.

From the
surrounded by a
belt of mangrove -
mostly dead.

Ground covered bright
by *Coccoloba* ground
& other barnacles growth
to broad belt of trees,
rather open, mixed of
dead. A carpet of
Pithecellobium, *Sabalacca*, *Prunus*,

Chrysobalanus
+ *Mangrove*.
There a few scattered
Balanites *bogotensis* *Pithecellobium*
+ a belt of trees
with mixed dead
or living small
Prunus & *Bursera*.

Entire area, aside the
entire belt of trees
seems dead.

On N.W. end mangrove
are dead except the few
living the outer beach.

Here pelicans, roseate spoonbill,
cormorants, and reddish ibis
are roosting.

Arecinaia germinans
Rubiopeltis *magnifica*
Conocarpus erectus
Pithecellobium
Begoniamutica
Heliconia perennis
Maytenus phyllanthoides
Bromelia pulchra
Luaedea *crenata*
Peltaria (*Argemone*) *spinosus*
Spatholobus
Cyperus
Strigia
Ceratina *myrsinifolia*
Pisonia
Pectobium
Alternanthera
Taraxacum
Lalobt *pratense* (dead)
Euphorbia heterophylla
Caesalpinia bonduc *impala*
Laguncularia
Balanites *bogotensis*
Garcinia *biflora*
Euphorbia heterophylla
Spartina
Sporopholis *virginicus*

Barbados -
 2 small new buildings
 and a stonewall around
 the point at end of road.
 A new overlook has
 been built, surrounding
 the place where the
 anhingas used to
 congregate. They have
 mostly left. In the
 ponds I saw a few
 abundant. *Panurus*
chrysotomus and *Spoon-*
bill, *Crane*, *Stork* (along at by
 Edga Bahia to be seen), in
 pairs, flocks, or small
 flocks.

Small Is.
 Vegetation and fauna on the
 Everglades Keys
 See Ms. 30:33-43 33

Garrison, R. J. & Lovelace, H. G.
 The influence of marine
 bottom communities on the
 depositional environment
 of sediments.

Jour. Geol. 66:310-318, 1958.

May 7. Hammock on
 Jennings Estate
 in Miami white
 streaks off abruptly and
 thick mangrove extends
 seaward.

Celtis laevigata
Walbergia acastodiphylla
Cissus antarctica
Annona glabra
Fragaria vesca
Bursera simaruba
Jasminum frangula
Calycera alliacea
Tragodendron flexuum
Pouteria foetidissima
Psidium
Coccoloba diversifolia
Eicus eugenoides
Nephrolepis cordifolia
Ardisia excelsa
Mysore

An old spring, or creek mouth,
 now dried up by lowered
 water table shows the
 best example of cross-bedding
 I have ever seen in
 Miami white.

May 2 - about 1.2 m. n of
Flamingo

45199

In "bay head", a tongue
of hammock with deep peat.
Pistotum nudum (L.) Beauvois
rare, on fallen tree trunks

May 2 - Nine Mile Bend,

45200

~~~~~ 9 mi. n. of Flamingo  
a small lake in borrow  
pit dug in limestone,  
perhaps slightly brackish

*Ruppia maritima* L.  
occasional, washed up

2 01 *Ruppia maritima* L.

common, washed up and  
also rooted in shallow water

11 02 *Bacopa monnieri*  
common on shores of

May 2 Royal Palm

Flamingo Trail

3 03 *Panicum haematochiton*

common in ponds to 1 m. or  
more deep, rooted in bottom except

prostrate, forming a  
loose mat, flowers lavender.

shallow hollow; ~~raceme~~  
panicle erect, branches  
closely appressed.

Tufts, culms ascending.

11 04 May 2 Flamingo

*Sporobolus dominicensis*  
common on sand flat  
back of beach

138 1960 Florida

May 2 - Palm Key, - - Florida Bay  
on fine compact marsh soil  
in full sun

- \* 45205) *Randia aculeata* ?  
locally common  
07 *Maytenus phyllanthoides*  
occasional

May 2 - Frank Key

- 08 *Halophila*  
floating in shallow water.  
09 *Euphorbia cyathophora*  
occasional in open  
area dominated by *Batis*,  
on marsh soil in interior  
10 *Capraria biflora*  
rare  
11 *Sporobolus virginicus*?  
very local  
12 (unseen)  
abundant on bare bottom of  
desiccated marsh pond

May 3 - Miami, Key Biscayne.

- 13 13) *Jessica clusiifolia*  
rare in strand scrub  
on sand flat  
14 *Fimbristylis cymosa*  
occasional on sand flat

Everglades Nat. Park

139

shrub 1 m. tall; flowers  
white, fragrant.  
shrub 1 m. tall; seeds  
with red fleshy aril,  
erect in capsule.

erect, lactiferous, bracts  
scarlet at base.

sterile

shrub 1.8 m tall, flowers  
white, fragrant, ~~black~~ corolla  
strongly salverform; fruit  
green.

"Banquo rock," a platform, almost horizontal top layer, a mat of roots, up to several feet down, interlapping forward with three or four layers of *Lignocerasma*, a web of root casts forming a layer a few inches to several inches thick. Said to be in places several such layers. In places an apparently homogeneous rock, said, slightly perceptible off and on behind her. The exposed to gentle waves come out in thin striae which then apparently end under coverings of white lime. Sets of ~~laminar~~ <sup>laminular</sup> roots exposed by wave washing show such a low, the same gathering through close anastomosing.

142

143

1 200

University (2)  
agriculture Dept.

Forest Dept.

Forest Res. Inst.

Ministry Forest Prod. Div.

CSIR 300 sheet

CSIR 600 sheet

Vanuatu - 1000 sheet

CSIR  
Natural Products Res

Colleges where botany is taught

Interested people

Industries using  
plant materials

Indigenous drug users  
no of staff  
equipment

University (2)  
agriculture Dept.  
Forest Dept.  
Fore Res. Inst.  
Minist. Forest Prod. Div.  
CSIR  
Natural Products Div

100 sheets  
C51R 600 sheet  
Vine 800 - 1000 sheet

Colleges where botany is taught  
Interested people  
Industries using  
plant material  
Indigenous drug uses  
No of staff  
Equipment

Botany

11



AN INTERCONTINENTAL HOTEL

JAKARTA, INDONESIA  
CABLE, INMOTELCOR  
TELEPHONE  
OTOMAT 61801-6701-6751



INTERCONTINENTAL HOTELS



